THURSDAY, JANUARY 5, 1899.

AN EVOLUTIONAL POLEMIC.

Organic Evolution Cross-examined; or, Some Suggestions on the Great Secret of Biology. By the Duke of Argyll, K.G., &c. Pp. vi + 201. (London: John Murray, 1898.)

IT has always appeared a mystery to the writer of this notice why the phenomena of life should be dealt with by some men of science and by certain philosophical writers in a totally different spirit to that in which other groups of natural phenomena are considered and discussed. It is true that we know less about life than about other phenomena—it is true that the organic world is full of unexplained mysteries. Equally certain is it that the living organism can accomplish physical and chemical feats by processes which we are now ignorant of, and which we cannot at present imitate. But it is not obvious why because a particular department of knowledge, by virtue of its inherent difficulties and intricacies, happens to be in a different phase of development from other branches of human inquiry, that the whole domain of organic nature should be detached and delimited, and put on quite a different plane to any other department of science.

Anthropologists might offer a reasonable explanation of this difference of attitude by an appeal to the history of the development of natural knowledge. The early observers of nature and the writers of the ancient cosmogonies were not impressed by the slow and orderly course of the inorganic world in the same way that they must have been familiar with their organic environment. The facts and laws of physical science required something beyond mere casual observation for their elucidation, and the manifestations of these laws became impressive only when they reached the dignity of cataclysms. On the other hand, these writers were constantly being brought into contact with the living world in a hundred ways that had a more or less direct influence on their everyday lives. They must have noticed the plants and animals of the districts which they inhabited; the individuals of their own and other races must have been of more direct importance to them than the unobtrusive sequence of non-vital phenomena. It is not to be wondered at that in the ancient cosmogonies the living world should have been regarded in a different light to the world of "dead" matter, and a special mode of origination invoked. In brief, there has arisen a set of ideas which are even broader than "anthropocentric," and which might fairly be designated *biocentric*, and it is these ideas which, consciously or unconsciously, permeate the work now under consideration and all similar productions.

The Duke of Argyll will no doubt disclaim any such severance of vital and non-vital phenomena. In certain passages he states somewhat explicitly that he wishes it to be understood that he deals with nature as a whole in this cross-examination of evolution. But it will be evident to those who have followed the course of thought in this field, that this latest contribution from the doughty opponent of Darwin and Spencer and Huxley and Wallace is nothing but a compromise between the ancient biocentric system and the newer ideas of the order and sequence of nature. It is a kind of eviscerated Bridgwater Treatise with an aggressive binding, and with the honest and plain teleology of the writers of those famous old volumes replaced by the word Plan with a capital P. If we are not mistaken, there was a period in the author's literary career when he scouted the idea of evolution in any form. Be this as it may, he now tells us that he accepts "the leading idea of development" (p. 98), and he even goes so far as to say that he holds this idea "to be indisputably applicable to everything, and especially to organic life." The same statement is repeated in other forms elsewhere in the book (p. 189, for example). The Duke apparently prefers the word "development" to evolution. There is a subtle distinction here which the ordinary reader might overlook, and which it is therefore desirable to point out. Evolution has become associated with development through external causes controlled by, and in co-operation with, causes resident within the organism. Such, at least, is the idea which the writer has always associated with organic evolution. Development on the other hand, is associated with a process of spontaneous growth by virtue of an internal agency only. This appears to be the burden of the Duke of Argyll's tale as told in the three essays composing the present work, which essays have been reprinted, with slight alterations, from the *Nineteenth Century*.

This notion of an internal force of development implanted in the organism by an external agency is a very venerable dummy. The Duke has tried to furbish it up with a fresh coating of paint, but evolutionists will, I am afraid, not consider the new garniture sufficiently attractive to claim their attention. The old figure is still there, and the dents made by the sticks thrown at it by such skilled marksmen as Huxley and Weismann are too deep to be effaced. We find, for example, on page 155, that an essential feature of the creed of the "mechanical evolutionists" (as interpreted by the author) is "the internal directing agency or force, which always pursues a definite line of growth, so that all the demands of the completed structure must have been present from the beginning, &c." This is considered by the Duke to be a necessary consequence of the belief of the evolutionist that the development of the germ is to be explained by "processes of ordinary generation." Why, it may be fairly asked, are biologists to be so constantly reminded in wordy essays that the characters and attributes and properties of organisms must have been potentially present from the beginning of life? The whole case of the biocentric school amounts to this, and nothing more. So all the characters of a complex mineral must have been potentially present in the material atoms of which it is composed; and if there is an internal directing agency in the case of a "procreated" germ, there is just as much an internal directing agency in the mineral compelling a definite crystalline structure and chemical composition. We have never heard of any essayist taking the writer of a mineralogical treatise to task because he had failed to indicate to his readers that the structure and composition of minerals were to be explained by innate properties conferred in accordance with a prearranged plan.

We have dealt so far with these essays in their constructive aspect, but they have also a destructive side;

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and here we must in fairness to the author point out that he makes some good points out of Mr. Spencer's change of view with respect to the efficiency of natural selection. The whole of the first essay is in fact a kind of merry-making over Mr. Spencer's abandonment of that excellent child of his own creation, the term "survival of the fittest." We can safely leave the Duke in the hands of the veteran author of the "Synthetic Philosophy," but in so doing it may be well to indicate that many—perhaps we may say the majority of biologists in this country—have long ago parted company from Mr. Spencer on this question of the enhanced importance of "direct equilibration," and the subordinate position assigned to "indirect equilibration" in his later writings. When, therefore, evolutionists are withered with the reproach of being "mechanical" by the noble author of these three essays, *nous autres* can take comfort from the thought that it is those who in America are called the "Neo-Lamarckians," who are expected to realise the grossness of their conceptions.

The results of attempting to recast the old idea of "creation" in the mould of the modern theory of evolution are just those results to which all attempts at reconciliation appear to lead. What these results are can only be briefly indicated here; but if, as a study of mental attitude, the philosophical student will take the trouble to compare the destructive with the constructive side of the essays, he may find much material for his instruction. For surely it is instructive to find a writer using weapons for the demolition of an antagonist without apparently being aware that these same weapons are equally destructive when applied to his own position. The Duke is acutely critical in the first essay about Mr. Spencer's phraseology. He quotes with approbation Mr. Darwin's views about explanations which are good for everything in general, being good for nothing in particular (pp. 58-60). Every man of science will join hands with the Duke on this point. But after having indulged in such exceedingly great rejoicing over the abandonment of the hateful expression, "survival of the fittest," and all that is implied thereby, the author, in a later essay, lets us into the secret of his own view of the developmental process. It is all contained in the internal directive agency; it is—

> "the kind of causation which is conspicuous in the preconceived Plan, in the corresponding initial structure, and in the directed development of vital organs as apparatuses prepared beforehand for definite functions" (pp. 192-193).

Now, as far as natural and physical science has any voice in this matter, it may be equally well said that everything that happens in the universe is in accordance with a preconceived plan. But why offer this as an explanation especially to be invoked in the case of vital phenomena? It must be equally true of gravitation which causes an avalanche to overwhelm a village, or of an earthquake or volcanic eruption which destroys a city. It is precisely of that order of "explanation" which is good for everything in general, and therefore for nothing in particular. In other words, it may be the statement of a general truth or it may not—the point is one that is outside the scope of scientific inquiry—but it explains nothing, and it leaves us precisely where we were before. Curiously enough, the author tries to make Huxley responsible for this kind of explanation with respect to the vertebrate skeleton—

> "a Plan, laid down from its beginning, in its originating germs, with a prevision of all its complexities of adaptability to immense varieties of use. There must have been a prevision for these uses in certain elements and rudiments of structure, and in certain inherent tendencies of growth which were to commence, from time to time, the new and specially adapted structures" (pp. 161-162; also p. 120).

This is surely doing violence to Huxley's teaching; we can call to mind no passage in his works which bears this interpretation. We ask the Duke in fairness to Huxley to reperuse the fifth chapter of the second volume of Darwin's "Life and Letters."

The importation of ultra-scientific notions into the doctrine of evolution leads the author into all those other quagmires in which others have floundered before him. The summary of the Darwinian hypothesis, on pp. 60-61, is a travesty; the conception of variability, on pp. 108-109, is a totally inadequate statement of the actual state of knowledge; the reiteration of the epithets "mindless," "fortuitous," "haphazard," &c., as applied to variation, is an impeachment of Darwin's views which has been made over and over again, and which has been met over and over again. The attempt to hurry up the course of evolution, in order to meet the limits of time imposed by certain arguments from the physical side, leads the author to accept "discontinuous variation" or development *per saltum* (pp. 122-125). It may be of comfort to the Duke to know that Mr. Francis Galton will go some way with him here. But the analogy between the rapidity of individual development in some cases, such as in metamorphosis, and the rapidity of organic evolution, which is put forward as an original idea (pp. 120-124), appears to the writer to be a false analogy. The Duke's idea of discontinuous variation is given (p. 148) in the following words:—

> "It is conceivable that species might be really as constant and invariable as we actually find them to be, for some long periods of time—embracing perhaps centuries or even milleniums—and then suddenly, all at once, evolve a new form which should be equally constant, for another definite time to follow."

This may be conceivable, but we should like to have some evidence of its probability. It involves not only a sudden departure or "sport" on the part of the individual offspring, but the simultaneous and similar aberration of all the offspring of a particular generation. Even the much-abused "mechanical evolutionist" has never made such a draft as this upon the resources of the speculative faculty. The old "internal developmental force" was in the minds of its supporters a respectable kind of agency that might be expected to come into operation when the exigencies of external conditions required it. But here we have a suggested mechanism of development which makes one shudder to think what might happen if there were the very slightest hitch in the adjustment between the characters of the new form, which appeared when the proper moment had arrived, and the external conditions under which the alarum, as it were, went off.

The discussion of rudimentary organs from the author's point of view (p. 162 *et seq.*) is one of the best illustrations of the effect of introducing ultra-scientific "explanations" into the domain of natural science that will be found throughout the book. These organs are not vestigial, but prophetic. Such a rudiment

> "may be where it is—simply because it indicates an original direction of growth, or of development, which was made part of the vertebrate Plan from the beginning of the series, for the very reason of its potential adaptability to an immense variety of purposes. Moreover, the arrest of such tendencies of growth, at a given point in the series, may well have been part of the same Plan from the beginning" (pp. 175–176).

The general public, who have hitherto been accustomed to consider the essence of the theory of evolution to be contained in the statement that man is descended from a tailed ancestor, will no doubt hail this statement of the Duke's with acclamation, because the rudimentary tail (which is discussed on p. 157) may after all be only "an arrested tendency of growth." The other logical alternative, that it is a preparation for a tail to be developed by generations yet unborn, is quite legitimate from this point of view, but the author will doubtless not insist upon this deduction. Similarly the rudimentary teeth and pelvic limbs of whales, which are also somewhat fully considered, are not necessarily vestigial in the sense of being the remnants of structures that were at one time functional. These rudiments are likewise to be regarded as "arrested tendencies of growth," or else as predetermined preparations for the transformation of whales into land animals. Honestly we prefer the Darwinian explanation—even though we have to face the difficulty of the electric organs of the Torpedo.

We have discussed these essays in the spirit of controversy because they are purely controversial in character. They have been considered also at greater length than their scientific importance warrants. Strictly speaking, it is difficult to see what class of readers are influenced by writings of this kind; certainly not working biologists of any school of thought. But the unlimited hospitality extended by the editors of high-class popular magazines to essayists of the calibre of the author of the present work, shows that such writers have the public ear, and it seems desirable to let the public know that the authority which is wielded by these knights of the pen is not conferred by those whose special studies in the field of biology might be reasonably supposed to give them the right of conferring such authority. There are some minds that may be satisfied with the word "Plan" as an all-sufficient explanation of natural mysteries yet unsolved. Like "the blessed word Mesopotamia," it may convey much comfort to such minds; but the earnest seeker after scientific truth will not be deluded, and he will still go on groping his way towards a knowledge of the processes by which the universe has been evolved by the only legitimate methods of observation, experiment, induction and deduction. It may be that, as Darwin long ago suggested, a definite set of characters undergoing selection may by inheritance tend to go on varying in the same direction, and so give to the course of development an impetus as though from some internal agency. But this agency would be only apparent, and not real in the sense of being a special entity. It would be a necessary consequence of heredity combined with other properties of living organisms which are "internal" in the same sense that crystalline form is due to the play of internal forces, and in no other sense. If, as the recent investigations of Prof. Karl Pearson seem to show, there is a tendency on the part of a race to undergo change in a definite direction, this tendency is the necessary consequence of correlation between fertility and other characters of the organism. To say that the laws of inheritance are the expressions of a preconceived Plan may be a statement of pious opinion, but as a scientific explanation it is quite devoid of value.

R. MELDOLA.

THE TIDES POPULARLY AND PROPERLY TREATED.

The Tides and Kindred Phenomena in the Solar System. By Prof. G. H. Darwin, Plumian Professor of Astronomy, Cambridge. Pp. xviii + 342. (London: John Murray, 1898.)

WHEN a man of unequivocal scientific eminence lays aside the technicalities which have assisted him along the path of important investigations, and attempts to reveal as much as may be of his subject to the wide public who cannot understand mathematical processes, the result is certain to be at least interesting. And especially is this so in the case of a subject at once so fascinating and so perplexing as that of the tides. A phenomenon of such evident significance in the economy of the globe, of such important influence on the interests of maritime communities, must necessarily have been under observation from the earliest times. Naturally the conscientious pre-Newtonian philosopher could not do more than recognise a more or less indefinite connection between the periodic alternations of sea-level and the positions of the moon and sun. And if his mind happened to be of that type which trusts more readily to speculation than to accurate observation, his theories were even less enlightened in a corresponding degree. Even after the genius of Newton had laid a foundation of rational hypothesis, the theory which remained with little modification or development until a comparatively short time ago, was one which on many essential points was absolutely contradicted by facts. Now this is the theory of which a rather inadequate description is included in some popular works on astronomy, whose most conspicuous failing in general is that they attempt to cover a far wider range than is really practicable. However that may be, a short chapter in a work of this character was practically the only place where information on tidal phenomena was to be found in a popular form, with the exception, of course, of Lord Kelvin's admirable popular lectures. In consequence, the subject of the tides is perhaps the one about which, more than any other, the most widespread misapprehension exists, even among persons who are otherwise fairly well informed. The present work therefore fills a manifest need, and Prof. Darwin is certainly right in thinking "that there are many who would like to understand the tides, and will make the attempt to do so, provided the exposition be sufficiently simple and clear." His dictum, that "a